REMARKS

The Examiner's objection to the drawings is noted. Applicants submit herewith corrected drawings which address the Examiner's objections. With respect to shading of elements 11, 12, 13, 15 and 8, it is submitted that using a unique cross-hatching for different materials is suggested by MPEP § 608.02(IX) *when* the material is an important element/feature of the invention. It is not a requirement for a drawing illustrating a cross-section of an element to identify the specific material of the element, as a given element can be made from one of multiple materials. Accordingly, the *generic* cross-hatching of elements 11, 12, 13, 15 and 8 is believed appropriate.

Claims 24, 25 and 39 stand rejected under 35 U.S.C. § 102 as being anticipated by Phillips et al. '595 ("Phillips"). This rejection is respectfully traversed for the following reasons.

Both independent claims 24 and 39 recite in pertinent part, "a first radiation-conductive element arranged substantially in parallel with a grounding substrate … [and] a second radiation-conductive element arranged substantially in vertical to the grounding substrate … ." The Examiner has broadly interpreted element 42 of Phillips as the claimed first radiation-conductive element and reads element 26 or 28 as the claimed second radiation-conductive element. Although it is understood that the Examiner can interpret claim language as broadly as *reasonably* possible, the Examiner can not interpret claim language in a manner that would be inconsistent with the recognized meaning of a claimed term as understood by one of ordinary skill in the art.

In this regard, it is respectfully submitted that one of ordinary skill in the art would not interpret the high Q circuit element 42 of Phillips as a "radiation-conductive element." Phillips does not suggest that the high Q circuit element 42 emits radio waves. Indeed, Phillips teaches away from such a broad interpretation by expressly identifying the antenna's radiation elements as

consisting of *radiator* elements 26 and 28 rather than element 42. Moreover, element 42 is connected to the actual radiator elements 26, 28 via wire 38 so that, based on the Examiner's interpretation, radio waves would leak from a member other than the radiator elements, thereby making the Examiner's interpretation of the high Q circuit 42 as a radiation-conductive element unreasonable and technically incorrect. It should further be noted that the high Q circuit 42 is positioned behind a ground plane 30 which would prevent radio wave emission to the outside of the case 16.

Contrary to the Examiner's broad interpretation, it is respectfully submitted that one of ordinary skill in the art would interpret the high Q circuit element 42 of Phillips as an impedance matching circuit. Phillips discloses in pertinent part:

> Coupled to the variable capacitor 32 are dual banding means for providing two closely adjacent frequency bands. The dual banding means include a high Q circuit element, generally 42, which simulates a parallel tuned circuit. The parallel tuned circuit is a transmission line stub 44 pretuned to frequency by adjusting the length of a pair of spaced conductors (not shown).

Attached hereto as an Exhibit is a partial translation of a Japanese reference ("Antenna Engineering Handbook") describing a matching circuit which corresponds to the disclosed functionality of the high Q circuit of Phillips. In view of the foregoing, it is submitted that the Examiner's reliance on Phillips as disclosing the claimed combination is improper.

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed, either expressly or inherently (noting that "inherency may not be established by probabilities or possibilities", *Scaltech Inc. v. Retec/Tetra*, 178 F.3d 1378 (Fed. Cir. 1999)), in a single prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986), based on the forgoing, it is submitted that Phillips does not anticipate claims 24 and 39.

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.,* 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 24 is patentable for the reasons set forth above, it is respectfully submitted that claim 25 dependent thereon is also patentable. In addition, it is respectfully submitted that claim 25 is patentable based on its own merits by adding novel and non-obvious features to the combination. Based on the foregoing, it is respectfully submitted that all pending claims are patentable over the cited prior art. Accordingly, it is respectfully requested that the rejection under 35 U.S.C. § 102 be withdrawn.

CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below. To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,
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Facsimile: 202.756.8087
Date: January 4, 2005

Exhibit

Partial English Translation of "Antenna Engineering Handbook"

[3] Impedance Matching Circuit

Fig. 3.10: A matching circuit implemented by a lumped constant circuit

Fig. 3.11: A stub matching circuit and a chart for designing it

We now define a characteristic impedance and a load resistance as "Z_0" and "R", respectively. One of circuits shown in Figs. 3.10(a) and 3.10(b) is selected according to which of the "Z_0" and "R" is larger. "L" and "C" are combined as shown in the figures, and the "L" and "C" is determined to satisfy the following relation:

$$\omega 2L = \sqrt{R|Z_0 - R|}$$

$$\frac{1}{\omega C} = Z_0\sqrt{\frac{R}{|Z_0 - R|}}$$

Then, an input impedance completely matches "Z_0".

Fig. 3.11(a) shows a circuit implemented by a distributed constant circuit and called "a stub" or "a trap".

Fig 3.11(b) shows a chart for designing it. This matching circuit is mainly used to provide a narrow frequency band.

アンテナ工学ハンドブック

Exhibit

ンも一種の整合回路である．（佐藤(源)）

〔2〕 変 成 器　結合コイルを用いた理想的な変成器は，非常に広帯域特性を有する．その特性の良否を示す量として，図3·8

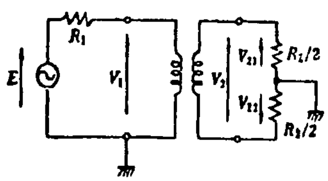


図 3·8 変成器

に示す諸量を用いて，動作減衰量は，

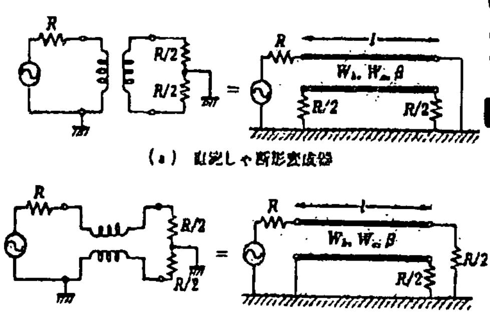
$$\alpha_B = 20\log_{10}\left|\frac{E}{2V_1}\right| + 10\log_{10}\left|\frac{R_2}{R_1}\right| \text{ [dB]}$$

また，不平衡減衰量は次式で表される．

$$\alpha_u = 20\log_{10}\left|\frac{V_{21}-V_{22}}{V_{21}+V_{22}}\right| \text{ [dB]}$$

巻線形結合コイルを用いた変成器の機能は，インピーダンス変成が主であるが，その他に平衡・不平衡変換，電力分配などに用いられる．

高周波では，特性インピーダンス，線路長を考慮して設計され[3][7]，その例を図3·9に示す．（池田）



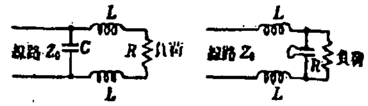
(a) 集中定数形変成器

(b) 線路形変成器

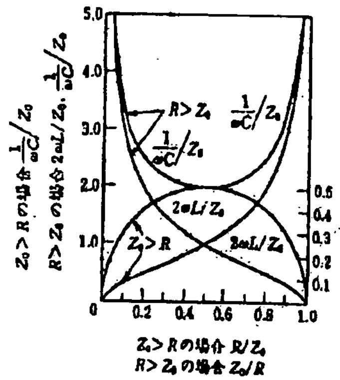
W_b: 平衡特性インピーダンス
W_u: 不平衡特性インピーダンス

図 3·9 各種の2重ら旋形変成器

〔3〕 ~~[illegible]~~　線路の特性インピーダンスを Z_0，負荷抵抗を R とする．図3·10(a)，(b)は Z_0 と R との大小



(a) $Z_0>R$ の場合　　(b) $Z_0<R$ の場合



(c) 設計図

図 3·10 集中定数回路素子を用いた整合回路

に従って一方を選び，コイル L と容量 C を図のように組み合わせ，その定数を，

$$\omega 2L = \sqrt{R|Z_0-R|}$$

$$\frac{1}{\omega C} = Z_0\sqrt{\frac{R}{|Z_0-R|}}$$

に選べば，その入力インピーダンスは Z_0 に等しく完全整合する．図(c)はその設計図[1]である．~~図3·11(a)は分布定数回路素子を用いたもので，スタブ(stub)または トラップ(trap)とよばれ，~~その値は Z_0 と R との大小により異なり，次のように選べばよい．

$Z_0>R$ の場合：

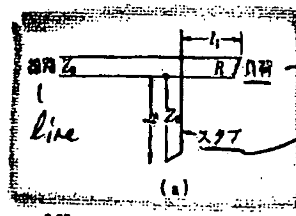
$$\frac{l_1}{\lambda} = \frac{1}{2\pi}\tan^{-1}\sqrt{\frac{R}{Z_0}}$$

$$\frac{l_2}{\lambda} = \frac{1}{2\pi}\left\{\pi - \tan^{-1}\frac{\sqrt{R/Z_0}}{1-R/Z_0}\right\}$$

$Z_0<R$ の場合：

$$\frac{l_1'}{\lambda} = \frac{1}{\pi}\tan^{-1}\sqrt{\frac{R}{Z_0}}$$

$$\frac{l_2'}{\lambda} = \frac{1}{2\pi}\tan^{-1}\frac{\sqrt{Z_0/R}}{1-Z_0/R}$$

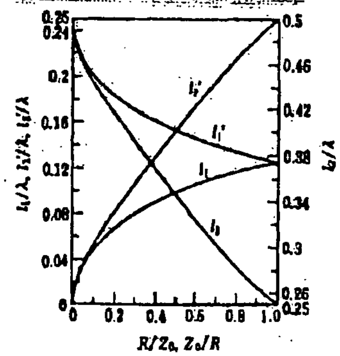


Load

line

STub

(a)



(b)

図 3·11 スタブ整合回路およびその設計図表

図3·11(b)にはその設計図[3]を示す．この整合回路は，主に狭帯域特性の場合に使用される．

図3·12は中心波長 λ_0（その周波数 f_0）の1/4の線路を用いた4分の1波長整合回路(quarter-wave matching circuit)で，その特性インピーダンス Q を，

$$Q = \sqrt{Z_0 R}$$

に選べば，中心周波数 f_0 において完全整合し，その周波数特性は図3·12のようになる．この特性をさらに良好にしたのが図3·13に示す2段4分の1波長整合回路(double quarter-wave matching circuit)[10]であり，こ

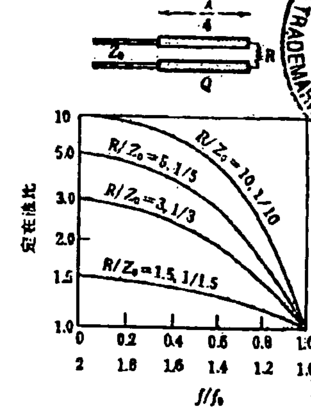


図 3·12 4分の1波長整合回路とその周波数特性

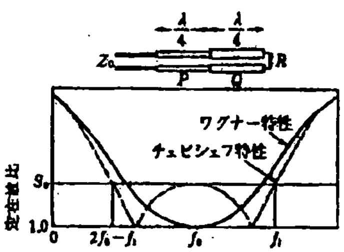


図 3·13 2段4分の1波長整合回路とその特性

の特性は中心周波数において完全整合し，平たんな最大平たん(maximally flatness)特性を有するワグナー(Wagner)特性のものと，必要とする帯域内において一定の定在波比 S_0 を許容するチェビシェフ(Chebyshev)特性のものがある．おのおのの特性インピーダンス P，Q の値は次のように選べばよい．

ワグナー特性[11]においては，

$$P = Z_0^{3/4}R^{1/4} \qquad Q = Z_0^{1/4}R^{3/4}$$

チェビシェフ特性[11]においては，

$R>Z_0$ の場合：

$$P = \sqrt[4]{Z_0^3 R S_0} \qquad Q = \sqrt[4]{\frac{R^3 Z_0}{S_0}}$$